

CLAIMS

1. An EGR cooler comprising tubes (3) and a shell (1) enclosing said tubes (3), cooling water (9) being supplied into and discharged from said shell (1), exhaust gas (10) being guided from a diesel engine into said tubes (3) for thermal exchange of said exhaust gas (10) with said cooling water (9), characterized in that a bypass flow path for guiding the cooling water (9) is arranged in said shell (1) so as not to cause stagnation of the cooling water (9) in said shell (1).

2. The EGR cooler as claimed in Claim 1 wherein the bypass flow path comprises a bypass conduit (16, 19, 20, 22).

3. The EGR cooler as claimed in Claim 1 or 2 wherein the bypass flow path comprises an inner space of the shell formed by reducing the number of tubes (3).

4. The EGR cooler as claimed in any one of Claims 1 to 3 wherein the bypass flow path is formed by peripherally curving the shell (1).

5. The EGR cooler as claimed in any one of Claims 1 to 3

wherein a bypass outlet (16d) of the bypass flow path is positioned within a cooling water outlet (5).

6. The EGR cooler as claimed in Claim 4 wherein a bypass outlet (16d) of the bypass flow path is positioned within a cooling water outlet (5).

7. An EGR cooler comprising tubes (33) and a shell (31) enclosing said tubes (33), cooling water (39) being supplied into and discharged from said shell (31), exhaust gas (40) being guided from a diesel engine into said tubes (33) for thermal exchange of said exhaust gas (40) with said cooling water (39), characterized in that the respective tubes (33) are arranged in the form of multiple concentric circles about an axis of the shell (31), pitches (a, b, c) between the tubes constituting the respective concentric circles being gradually increased from outer to inner ones of the circles.

8. An EGR cooler comprising tubes (33) and a shell (31) enclosing said tubes (33), cooling water (39) being supplied into and discharged from said shell (31), exhaust gas (40) being guided from a diesel engine into said tubes (33) for thermal exchange of said exhaust gas (40) with said cooling water (39), characterized in that the

respective tubes (33) are arranged in the form of multiple concentric circles about an axis of the shell (31), pitches (a', b', c') between the respective multiple circles constituted by the tubes being gradually increased radially from the periphery to the axis of the shell (31).

9. An EGR cooler comprising tubes (33) and a shell (31) enclosing said tubes (33), cooling water (39) being supplied into and discharged from said shell (31), exhaust gas (40) being guided from a diesel engine into said tubes (33) for thermal exchange of said exhaust gas (40) with said cooling water (39), characterized in that the respective tubes (33) are arranged in the form of multiple concentric circles about an axis of the shell (31), pitches (a, b, c) between the tubes constituting the respective circles being gradually increased from outer to inner ones of the circles, pitches (a', b', c') between the multiple circles constituted by the tubes being gradually increased radially from the periphery to the axis of the shell (31).

10. The EGR cooler as claimed in Claim 8 or 9 wherein the central tube (33) is arranged at the axis of the shell (31), a pitch between the innermost circle and the central tube (33) being largest.